

Casuarina Coastal Reserve Management Plan April 2016



Intent of this Plan

This is not a statutory plan. Its purpose is to engage and inform the public on how the Reserve will be managed into the future. This is the third Management Plan prepared for the Reserve. Input for this Plan was provided by key stakeholders including the Casuarina Coastal Reserve Advisory Committee and various community users and groups. The Plan will remain in operation until replaced by a new management plan.

The Reserve is not declared under section 12 of the *Territory Parks and Wildlife Conservation Act* and there is no requirement for this Plan to be tabled in the Legislative Assembly. The Minister for Parks and Wildlife may however choose to table this Plan for information only.

Proposals in this Management Plan comply with Northern Territory and Commonwealth legislation and Parks and Wildlife Commission policies. Detailed information on policies and systems used by the Parks and Wildlife Commission and relevant to all Territory parks and reserves can be viewed on the Departmental website at www.parksandwildlife.nt.gov.au. This Management Plan focuses on the specific characteristics of Casuarina Coastal Reserve.

This document is available at: www.parksandwildlife.nt.gov.au/manage

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Executive Summary

The Reserve and its Values

Casuarina Coastal Reserve is Darwin's premier urban reserve attracting over 935 000 visits annually. It is a much loved area of Top End woodland, monsoon vine forest and picturesque coastline located 15 km from Darwin City. The Reserve covers approximately 1361 ha and locals and visitors use the area to exercise, walk with the dog, cycle, escape to the bush or the beach. The Reserve is very popular with recreation, sporting and community groups.

While primarily for recreation, the Reserve protects natural and cultural values which are significant at a local level where habitat is diminishing rapidly. The natural settings are important to the people of Darwin as they underpin the visitor recreational experience. Locals and visitors who enjoy the Reserve are passionate about its management and the protection of the natural values which make the Reserve what it is. The Reserve has an important role to play in educating locals and visitors alike, about Top End habitats and looking after the environment.

The key natural values protected in the Reserve include important feeding and roosting sites for migratory waders and shorebirds, the most significant seagrass meadows in Darwin Harbour and nesting sites for three marine turtle species. By working with community groups and locals it will be possible to promote public awareness of the importance of the Reserve in protecting these values.

The Reserve lies within the area traditionally occupied by the Larrakia people. There is one registered sacred site and five recorded sites within the Reserve. The area is very important and still regularly used by the Larrakia people.

Casuarina Coastal Reserve has historical significance as it was developed as part of a coastal defence strategy which included the construction of at least 11 'Singapore-style' observation posts along Casuarina Beach. Remnants of 10 observation posts remain and visitors are able to walk around one which is a declared heritage site.

The Reserve is used for many purposes by many stakeholders ranging from community groups, schools, Charles Darwin University, environmental groups and sporting clubs. It is important for the Parks and Wildlife Commission to work closely with these stakeholders and to support multiple and varied uses of the Reserve.



The Reserve offers a wide range of activities for locals and visitors.

Key Management Priorities

This is the third Management Plan prepared for the Reserve. It sets management objectives, addresses current issues and proposes appropriate measures to guide management and development over the life of the Plan. The Plan gives direction for the day-to-day management of the Reserve. It focuses on enhancing the visitor experience through the improvement and development of facilities.

Casuarina Coastal Reserve will continue to be managed as a place for recreation and enjoyment offering a wide range of activities from walking and cycling to bird watching. The Reserve will continue to offer opportunities for community involvement including environmental and sporting activities.

While protection of key natural values including Top End woodland, monsoon vine forest, dune systems and the marine environment is important, the key management focus will be on providing quality visitor facilities and activities in a healthy environment. The key management priorities include:

- implementing the Experience Development Plan including an Erosion and Drainage Plan;
- implementing new Domestic Animal Regulations and undertaking a public awareness campaign outlining the changes;
- promoting more public involvement in the Reserve and working with the community, environmental and recreational user groups, including the Casuarina Coastal Reserve Landcare Group; and
- continuing to work with local groups to encourage public awareness of the importance of all wildlife and native flora in the Reserve and significant species such as migratory waders, shorebirds and marine turtles.



The Reserve has a lot to offer visitors

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1.0 Introduction

1.1 The Reserve and its Purpose

Casuarina Coastal Reserve receives over 935 000 visits annually and is mainly visited by locals, some of whom visit on a daily basis. It is used as an area to exercise, walk with the dog, cycle or escape to the bush or the beach. It is a much loved area of Top End woodland, monsoon vine forest and picturesque coastline.

While set aside primarily for recreation, the Reserve protects natural and cultural values which are important to the people of Darwin and underpin the visitor (recreational) experience. Locals and visitors who enjoy the Reserve can be passionate about its management and the protection of the natural values which make the Reserve what it is.

The Reserve covers 1361 ha and includes an 8 km strip of coastline and adjoining offshore marine area. It protects coastal habitats between Rapid and Buffalo Creeks, including sandy beaches, dramatic cliffs and shady casuarinas. The Reserve is also an important site for migratory waders (shorebirds) and Flatback turtles nest here annually.

The Reserve extends past the low water mark and includes tidal flats, estuaries, and mangrove communities. It also includes some of the best expanses of sea grass in Darwin Harbour. These sea grass meadows provide important feeding grounds for dugongs.

The Larrakia people speak for this area and maintain links with the land and its sacred sites. Darriba Nungalinya, also known as Old Man Rock, is a large rock located in the waters off Casuarina Beach and is sacred to the Larrakia people.

The story of Darriba Nungalinya (Old Man Rock)

"After a tragedy concerning his wife, the first Larrakia man, Darriba Nungalinya travelled from Koolpinyah to Casuarina where he rested on the beach. His wife Mudjamurriba followed him and hid in the sand dunes.

After a long time Darriba moved away from the beach out into the water where he created Old Man Rock. His wife, filled with sorrow, wandered back and forth through the sand dunes and the bush behind crying out to him. Every once in a while she flies out to visit him and after a brief stay, returns to the beach."

The Reserve has historical significance as it was developed as part of a coastal defence strategy after World War I. In 1939, at least 11 observation posts were built in the Reserve in the years leading up to 1942. Remnants of 10 observation posts remain in the Reserve and one of these, located near Sandy Creek, is a declared heritage site. Interpretation provided in the Reserve enables visitors to learn about its European history.

1.2 Location and Reservation

Casuarina Coastal Reserve was gazetted in pursuance of section 103 (1)(c) of the *Crown Lands Act* for the 'recreation and amusement of the public' on 17 September 1982. The Conservation Commission was given management of the area under section 103B(2) of the *Crown Lands Act* on 18 October 1982. Prior to this, the Reserve was managed by the City of Darwin.

As stated above, the Reserve is currently gazetted under the *Crown Lands Act* however there is potential for the Reserve to be declared a park under section 12 of the *Territory Parks and Wildlife Conservation Act*. The declaration of the Reserve under this act would enable the land to be held as a park or reserve in perpetuity.

Casuarina Coastal Reserve (Lot 9375) is located in the northern suburbs of Darwin, approximately 15 km from Darwin City. The Reserve is neighboured by the suburbs of Brinkin, Tiwi, Rapid Creek, Lyons and Muirhead. Other neighbours include the Defence Housing Authority, the hospital precinct and Charles Darwin University (see Figure 1).

The land surrounding the Reserve is rapidly developing with a new housing estate proposed for Lots 4873 and 9370 Town of Nightcliff, known as 2CRU and Muirhead North, respectively. The proposed development will accommodate approximately 700 ground-level dwellings, between 30 and 40 rural lots, between 200 and 250 residential apartments and between 200 and 300 hotel / motel rooms. If developed, this new estate will see a significant increase in the number of people living adjacent to and visiting the Reserve. This increase could significantly impact the way the Reserve is used and managed.

The Reserve is a narrow coastal strip, being only 1361 ha, and so is likely to be impacted by sea level rise in the long-term. There may be opportunities to expand the Reserve through the inclusion of some land from Lot 9458 and Lot 4873. This potential expansion will be further investigated.

Excised from the Reserve is NT Portion 9316, the Darwin Surf Life Saving Club (SLSC). The Club covers an area of 7000 m² and is surrounded by the Reserve. The land was granted to the SLSC in January 1993 as a Crown Lease in Perpetuity. Rangers and the SLSC have developed a good working relationship over the years.

The Management Plan for the Reserve also includes an area of land adjoining the Reserve's eastern boundary described as the Buffalo Creek Management Area (Figure 1).¹

Buffalo Creek Management Area

The Buffalo Creek Management Area is a popular recreational fishing location which includes a boat ramp, picnic area, car park and an attractive stretch of beach which at certain times of year is a resting and feeding place for many migratory shorebirds. The Buffalo Creek Management Area covers an area of 222 ha including Lot 8700 Town of Nightcliff and part of Portion 2260 Hundred of Bagot and extending to the low water mark. The land is owned by the Commonwealth of Australia (Department of Defence) and adjoins the Reserve's north eastern boundary. The Management Area is surrounded by largely undeveloped land also owned by the Commonwealth.

The Commonwealth acquired the land covered by the Management Area in 1978. The area has always been popular with fishermen and in the early 1970s the Buffalo Creek boat ramp was built to provide better access. In the early 1980s, the former Conservation Commission upgraded the ramp and developed car park and toilet facilities.

Rangers have managed the Buffalo Creek area on and off since the early 1980s. In 2001, the car park and toilet block were upgraded and a picnic area was developed adjacent to the boat ramp under a formal management agreement between the Commonwealth Department of Defence and the Parks and Wildlife Commission. The Parks and Wildlife Commission have managed the area since 2000, under a Management Agreement under section 74 of the *Territory Parks and Wildlife Conservation Act*. This

¹ Unless otherwise stated, future references to Casuarina Coastal Reserve will also encompass Buffalo Creek Management Area.

agreement vests management responsibility for the area to the Commission for the protection of flora and fauna. The Management Agreement is due to expire in 2016.

This area is an important asset to the Reserve. The boat ramp and picnic areas are important from a recreational perspective while the beach is important from a conservation perspective. The Parks and Wildlife Commission will continue to liaise with the Department of Defence to investigate the possibility of these key areas being included in the Reserve in the long-term.



The Buffalo Creek boat ramp is popular with recreational fishers

Management Actions

- Monitor the impact of the increase in visitor numbers as a result of the development of the newly proposed housing estate on Lots 4873 and 9370. If required amend the Domestic Animal Regulations to accommodate this increase.
- Investigate the potential for the Reserve to be declared under section 12 of the *Territory Parks and Wildlife Conservation Act*.
- Investigate the potential to expand the Reserve through the inclusion of portions of Lot 9458 and Lot 4873.
- Continue to work with the Darwin Surf Life Saving Club to ensure good working relationships are maintained.
- Investigate the potential for the key areas within the Buffalo Creek Management Area to be included within the Reserve in the long-term.

1.3 A Brief History of the Reserve

Casuarina Coastal Reserve has not always looked as it does now. Over the last 70 years, the Reserve and the surrounding area was affected by a number of events including:

- In the 1940s large areas of land along the coast were cleared and sand and gravel was removed for gun emplacements and lines of sight as part of World War II preparations. The beach was secured with barbed wire entanglements and star pickets.
- The 1960s and 70s saw population growth in Darwin and an increase in recreational use of the area now known as Casuarina Coastal Reserve. This included off-road vehicles and pedestrians cutting their own access paths to the beach. It also saw extensive sand mining, including areas adjacent to the Darwin Surf Life Saving Club, which caused further degradation of the area.
- The early 1970s saw the development of the suburb of Tiwi including subsequent storm water run-off into the Reserve which caused the silting of Sandy Creek. Further urban development in the suburb of Alawa saw bulldozing of mangroves along Rapid Creek where it was proposed to build a recreation lake.

- In 1974, Cyclone Tracy hit Darwin followed by storms in 1975. These events had a significant impact on the Reserve and caused considerable damage and erosion. In some places the dunes receded up to 60m, almost breaking through the mangroves at Sandy Creek.
- Restoration works were carried out in the area in the mid-70s including reforming of the dunes, establishment of sand traps and rehabilitation of dunes through plantings. By the late 1970s the area had been extensively rehabilitated and stabilised and was again a popular recreation site.
- Recognising the highly dynamic nature of the coastal zone, from the mid-70s through to 2010 the landforms in the Reserve remained in a relatively stable condition.
- In 1993, NT Portion 9316 was excised from the Reserve and granted to the Darwin Surf Life Saving Club.
- In 2011, Cyclone Carlos caused severe erosion to sections of the beach and frontal dune system. An extended monsoon period in early 2014 also caused damage to the dunes in the Reserve.
- Urbanisation of the area surrounding the Reserve has also impacted on the Reserve and its habitats through an increase in wildfire, weeds, erosion and sedimentation.

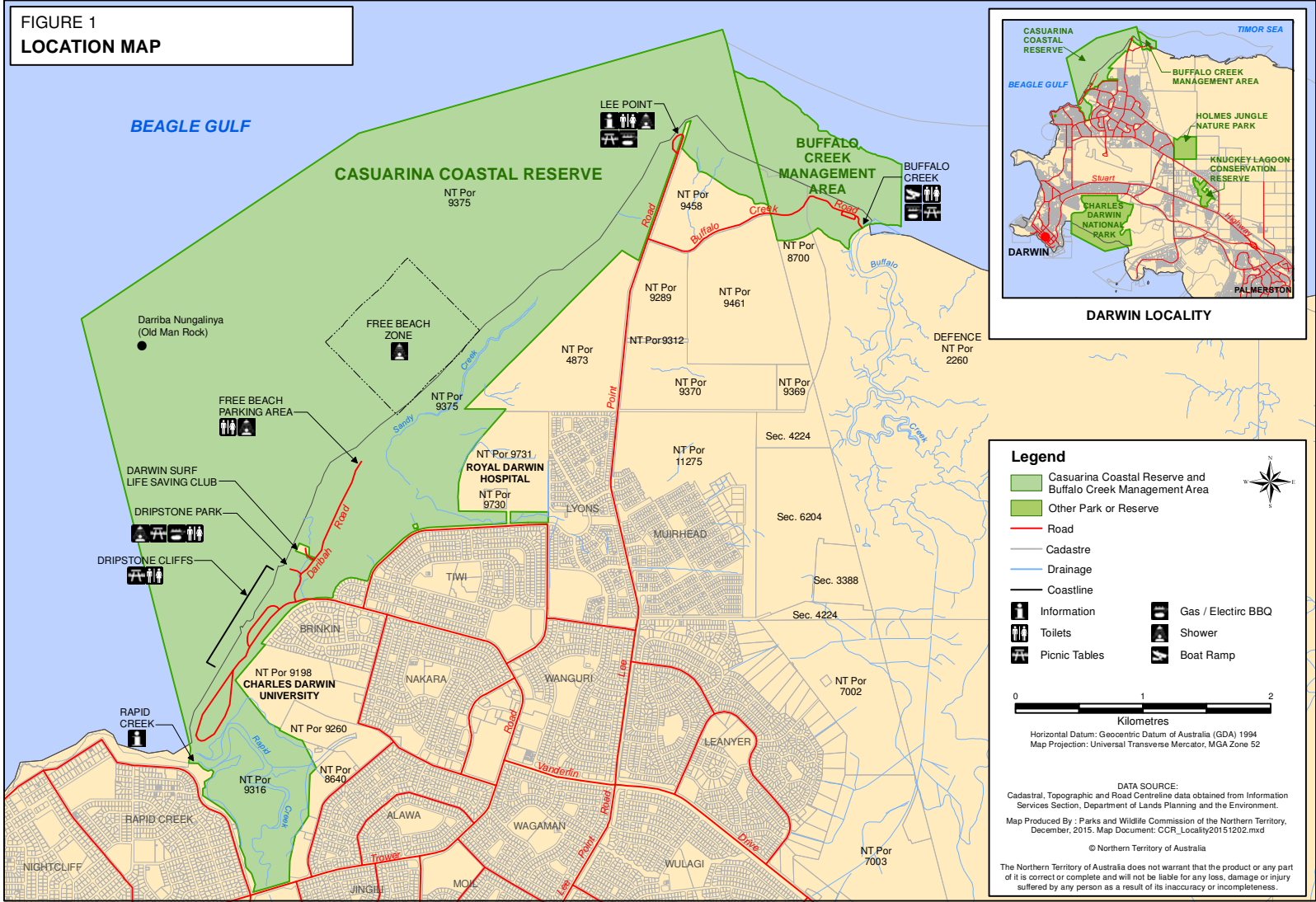
1.4 The Relative Importance of the Reserve

The Parks and Wildlife Commission's Management Effectiveness Framework informs priority setting and resource allocation across the NT parks and reserves system. Part of the Framework establishes the relative importance of each park in the park system by assessing each park's contribution to biodiversity conservation, and to recreation and tourism. It does not compare cultural values across the park system. The Framework groups parks of similar importance and specifies general management standards to each group. The parks are given a class ranking from 1 to 4 with 1 being the most important and 4 being the least important.

Casuarina Coastal Reserve is a Class 1 Visitor park and a Class 3 Biodiversity park. Class 1 parks for recreational value should provide high quality facilities of superior design at key visitor sites for key experiences. Casuarina Coastal Reserve, as a Class 1 Visitor park, is most valued as a community recreation asset however it does still contribute to tourism.

As a Class 3 Biodiversity park, it requires management to protect identified, usually limited and site-specific conservation values.

FIGURE 1
LOCATION MAP



2.0 Managing for Visitors

A Vision for Visitor Experiences

A Reserve where locals and visitors can enjoy the beach or the bush beside a bustling capital city.

A Reserve providing a high standard of facilities enhancing visitors' recreational activities, experiences and appreciation of the natural and cultural values.

A Reserve providing a diverse range of recreation activities while nurturing a natural environment.

2.1 Healthy Parks Healthy People

In 2000, Parks Victoria created the *Healthy Parks Healthy People* (HPHP) brand as a way to reinforce the connections between a healthy environment and healthy communities and by doing so increase the value of parks to, and as perceived by the community. The HPHP approach has been applied in many places around the world, bringing together the health, education, tourism, recreation, community development, environment and parks sectors with positive outcomes for all. These include measurable improvement in people's health and wellbeing and broadening of the user groups appreciating parks and, in turn, increased resources for their management. The approach has particular application for urban parks or parks close to urban centres.

The Royal Darwin Hospital precinct neighbours the Reserve. There is potential for land directly adjacent to the Hospital precinct to be used for the benefit of hospital patients, hospital staff and visitors. Use of this area could include activities such as walking, nature appreciation and relaxation.

Management Actions

- Investigate the potential for developing Reserve land adjacent to the Royal Darwin Hospital precinct for the benefit hospital patients, hospital staff and visitors.

2.2 Visitor Uses and Activities

Casuarina Coastal Reserve is the most highly visited park or reserve in the Northern Territory. The most popular activities include walking and sunset viewing/sightseeing and the feature visitors enjoy the most is the beach.

Casuarina Beach was recently recognised as one of the top beaches in the recent book, '101 Best Australian Beaches' (Short and Farmer 2012). Three beaches in the Northern Territory made the list including Mindil Beach, Casuarina Beach and East Woody Beach in east Arnhem Land. Casuarina Beach is one of the most popular destinations in the Reserve, however there are many other locations favoured by locals and visitors.

The *Tourism Vision 2020* (Tourism NT 2013) recognises the important role protected areas (such as parks and reserves) play in the Northern Territory and, in turn, the important part visitors can play in parks. The Strategy states, 'Increased visitation and use of national parks delivers regional economic benefits, as well as increased visitor awareness and an understanding of park values, ultimately contributing to long term conservation efforts'.

Visitor numbers to Casuarina Coastal Reserve is very high. With the Reserve being located in the northern suburbs of Darwin, it offers an attractive and easily accessible recreation area for locals. For many locals, the Reserve is an integral part of their Top End lifestyle.

The Reserve is not only used by locals but by sporting clubs, environmental groups, social clubs, personal trainers, health providers, Government agencies and non-Government organisations for health and wellbeing purposes. For example, the Department of Health uses the Reserve to improve the wellbeing of some of their patients from the Royal Darwin Hospital. Patients are taken for walks within the Reserve on a daily basis during the Dry season and less frequently during the Wet season.

It is also a popular place for visitors. A network of tracks weave through the Reserve taking visitors along spectacular cliffs and beaches or through shady bushland and monsoon forest. The Reserve offers a wide range of recreation opportunities including walking, relaxing, picnicking and bird watching just to name a few. The following section outlines some of the key recreation activities carried out in the Reserve.

Walking and jogging

Walkers and joggers regularly use the beach and walking tracks for exercise. Fitness clubs, such as Hash House Harriers, Orienteering Clubs and the Darwin Athletic Club train and hold events in the Reserve.

The paths and tracks in the Reserve are the main way for visitors to use and enjoy the Reserve. This Plan identifies all paths and tracks as shared; for pedestrians (and dogs on leashes) and cyclists. Dogs should be on a lead on all shared paths and 2m either side of the paths.

Beach and Water Activities

Casuarina Beach provides a focus for a wide range of beach activities including swimming, surfing, skim boarding, strolling, dog walking, ball games, kite flying and relaxing. A range of wind, wave and paddle powered water activities occur in the Reserve. Canoeing, kayaking and sailing occurs in the creeks and near shore areas.

Jet ski riders sometimes use the marine part of the Reserve, however there is no provision for public launching of jet skis in the Reserve. Jet skis are not permitted within close proximity to Darrabah Nungalinya (Old Man Rock). The Darwin Surf Life Saving Club may use jet skis as part of their standard activities.



Beach cricket on Casuarina Beach

Buffalo, Sandy and Rapid Creek, Casuarina and Lee Point Beach and the offshore reefs are popular fishing sites. Size and possession limits exist for some aquatic species in the Northern Territory and this is enforced by the Water Police Section of the NT Police. Fishing is not permitted in the freshwater reaches.

The Buffalo Creek boat ramp is popular with recreational fishers. It allows access to Shoal Bay and the Vernon Islands. Due to health concerns with water in Buffalo Creek, it is recommended that fish and crustaceans caught in the Creek should not be consumed.

The Darwin Surf Life Saving Club has a lease within the Reserve and runs lifesaving activities on Casuarina Beach, including patrolling the beach area in front of the clubhouse during the Dry season and some Wet season patrols. The Life Saving Club is a popular location for weddings and other events.

In early 2014, a café opened within the Surf Life Saving Clubhouse which has become very popular with locals and visitors. There is limited car parking available on the Surf Life Saving Club land which has, on occasion, led to patrons parking informally in the Reserve, along Daribah Road.

Barbequing and Picnicking

These activities are concentrated at Dripstone Cliffs, Dripstone Park and Lee Point where free facilities are provided. Casual picnicking, group and club functions occur throughout the Reserve.

Cycling and Mountain Bike Riding

Recreational cycling is very popular. A shared path runs from a pedestrian bridge over the mouth of Rapid Creek to Trower Road. Cyclists are also permitted to use the service track, which leads from the car park at the end of Daribah Road to the mouth of Sandy Creek.

Over the last 10 years, mountain bike riding has become popular. There are a number of unauthorised tracks located towards the Lee Point end of the Reserve that are currently used by mountain bike riders. Some of these tracks are eroded, some require maintenance and others will be closed.



Cycling is a popular activity in the Reserve

Any formalised tracks will require sign posting and need to be constructed and maintained in accordance with mountain bike track guidelines to ensure they are sustainable and do not negatively impact the environment. Local mountain bike groups have agreed to work with the Parks and Wildlife Commission to develop this area for mountain biking.

Sightseeing, nature study and bird watching

The Dripstone Cliffs area is ideal for viewing seascapes and sunsets and enjoying the cool coastal breezes. The varied bird life is partly the result of the Reserve containing a range of relatively undisturbed vegetation communities which provide food and habitat for these birds. This varied birdlife attracts naturalists, as it provides the opportunity for nature study.

Bird watching is very popular. The beaches at Lee Point, Buffalo Creek and Sandy Creek are recognised as important sites for resident shorebirds and migratory birds many of which are listed under international treaties for protection. Buffalo Creek was recently listed as one of the 'Best 100 Bird Watching sites in Australia' (Taylor S, 2013).

These sites are used for feeding and roosting by shorebirds and migratory birds. Counts in the Lee Point area have revealed more than 9000 shorebirds roosting there at high tide, comprising nearly 30 species, making this an important shorebird area (Kyne P, 2010). Most of these migratory birds arrive around October and depart around March, the following year.

The ease of access to these locations provides visitors excellent opportunities to observe these birds and through interpretative signage they gain appreciation for the birds and their environment.

The NT Field Naturalists Club Inc., with assistance from the Parks and Wildlife Commission, hold community events at Lee Point to raise the awareness of Reserve users about the migratory and resident shorebirds that use this area. These events are supported by the community and are a positive way of protecting the birds and educating Reserve users.

A group of dedicated bird watchers carry out monthly wader bird counts at a number of locations across Darwin, including Lee Point and Sandy Creek. These numbers are provided to Birdlife Australia to gain a picture of the number of migratory shorebirds birds using Australia's coasts as they move through the East Asian-Australasian Flyway.

Another group of birds of interest often found in the Reserve in groups of 20 or more are the Bush-stone Curlews (*Burhinus grallarius*). These birds are endangered or extinct in parts of southern Australia.

Turtle Hatchling Releases

Darwin is one of the few capital cities in the world that have marine turtles nesting on its city beaches and it is the only capital city to have Flatback turtles nesting.

The Olive Ridley turtle (*Lepidochelys olivacea*) and the Flatback turtle (*Natator depressus*) are both classified as data deficient in the NT and vulnerable under Commonwealth legislation (see also section 4.3). Flatback, Green and occasionally Olive Ridley turtles nest on Casuarina Beach.

The number of nests varies each year. To protect the turtle hatchlings from predation, Parks and Wildlife Commission staff, when possible, remove the hatchlings from the nest just as they are about to make their way to the water. Staff hold a turtle release for the public.

The turtle releases are a popular activity with more than 1000 names on the register at the time of writing. In 2012 there were eight releases and seven releases in 2013. Over 1100 people attended this activity in 2013.



Visitors assisting in the release of the turtle hatchlings

Horse Riding

Horse riding is permitted in the Reserve in areas designated under the domestic animal regulations (see section 2.5). The horse riding zones have remained the same as those outlined in the 2002 Management Plan and include the bridle path adjacent to Rapid Creek from Trower Road to the beach and along the beach and in the sea between the mouth of Rapid Creek and the northern end of Dripstone Cliffs.

Flying model aircraft and kites

The open areas adjacent to Rapid Creek and Dripstone Cliffs are used occasionally for these activities.

Wind Powered Activities

Wind powered activities occur in the Reserve using sails or kites to propel a wind powered cart. To avoid conflict with other users and to ensure visitor safety (due to the speeds these crafts may generate), these activities are limited to the beach between the northern boundary of the Darwin Surf Life Saving Club and Sandy Creek.

Other Recreational Activities

The area at the tip of Lee Point is occasionally used as a landing site for parachuting. Helicopters also sometimes land at the front of the SLSC for events such as weddings. These activities will continue to be allowed as long as they do not impact on the environmental, cultural values or the experience or safety of visitors. These activities require a permit under the *Territory Parks and Wildlife Conservation By-laws*.

The Reserve is a popular location for community events such as orienteering and Dripstone Park is often used for activities such as yoga and fitness classes.

Fireworks

The Reserve is a popular place to celebrate Territory Day and is a favoured venue for visitors to let off fireworks. While fireworks continue to be a permitted activity of Territory Day, visitors will be able to let fireworks off on Casuarina Beach. Fireworks will also be permitted for special community events, if requested by an event organizer and via a permit under the *Territory Parks and Wildlife Conservation By-laws*. Fireworks will not be permitted to be let off in the Reserve outside these events.

Management Actions

- Improve and maintain visitor areas, infrastructure and interpretation to a Visitor Class 1 Reserve standard.
- Undertake a public education campaign advising visitors to the Reserve that all paths are shared paths and that both cyclists and walkers need to be considerate of other users. Dogs are required to be on a lead on all paths in the Reserve and within 2m either side of the path.
- Over the life of the Plan, review and determine if action is required in relation to the informal car parking along Daribah Road associated with the café in the Surf Life Saving Club.
- Working with mountain bike groups, develop a mountain bike track towards the Lee Point end of the Reserve. Install information and signage for the tracks to enhance visitor safety and enjoyment. With assistance from these groups, monitor usage and environmental impacts of tracks including weed management and erosion.
- Work with the City of Darwin and the tourism industry to promote mountain bike riding as a recognised visitor experience in the Reserve.
- With assistance from users, develop guidelines for the safe use of wind powered activities using sails, kites or similar on the beach, for example 'Blokarts'
- Continue to work with community groups to raise the awareness of Reserve users to the importance of Lee Point, Sandy Creek and Buffalo Creek to migratory and shorebirds.
- Fireworks will only be permitted in the Reserve on Territory Day and for special community events (via permit under the *Territory Parks and Wildlife Conservation By-laws*).

2.3 Casuarina Coastal Reserve Experience Development Plan

During the preparation of this Plan, the adequacy of existing facilities was reviewed and the need for new facilities and activities was assessed. Input into proposed future development of the Reserve was sought through the Casuarina Coastal Reserve Advisory Committee (see section 3.0) and the public.

Proposals for the upgrade of facilities and the development of new facilities were compiled into a detailed development plan for the whole Reserve. This Experience Development Plan considers future

recreational needs of visitors, including measures necessary to ensure that the Reserve can cope with increasing visitor use while continuing to achieve and deliver a high quality visitor experience. The underlying principle in the Plan is to provide a diverse range of recreation opportunities for visitors through the development and upgrade of facilities while maintaining and protecting the Reserve's natural and cultural values. All developments will be designed to complement and enhance the Reserve's natural values.

The preparation of another Experience Development Plan may be necessary in the future as developments in the current one are implemented, or because of new opportunities arise, or visitor numbers increase to the point where new or more facilities are needed to ensure a positive visitor experience.

A key element of the Experience Development Plan will be the development and implementation of an Erosion and Drainage Plan.



Facilities in some areas of the Reserve are tired and need replacing

Erosion and Drainage Plan

The soil in the Reserve is highly susceptible to disturbance where vegetation cover is removed, along drainage lines and in areas influenced by storm activity such as foredunes. The Reserve contains several storm water drains and receives storm water from surrounding suburbs and public infrastructure (e.g. the Royal Darwin Hospital). These drains and the high volume of water pushed through the Reserve often lead to areas of erosion and in other areas sedimentation. This ultimately has a negative impact on the Darwin Harbour, which receives the storm water. For these reasons, additional care needs to be taken when designing and siting visitor facilities and providing access to ensure that such developments do not cause erosion or unduly damage other values of the Reserve. It is also important to assess the functionality of the existing storm water drains.



Erosion is a major issue along some of the tracks in the Reserve

To address these issues, a key element of the Experience Development Plan will be the preparation of an Erosion and Drainage Plan. This Plan will address existing erosion and sedimentation issues as well as ensuring that any proposed upgrades or new developments are appropriately sited and have minimal or no impact on the environment. Consideration will also be given to ensuring infrastructure is not sited in areas impacted by storm events or sea level rise.

Management Actions

- Implement the Casuarina Coastal Reserve Experience Development Plan.
- Develop and implement an Erosion and Drainage Plan as part of the Experience Development Plan.

2.4 Access

Vehicle access to the Reserve is along Trower, Daribah, Lee Point and Buffalo Creek Roads. Within the Reserve, sealed access is provided to Dripstone Cliffs, Dripstone Park, the Free Beach car park, Lee Point and Buffalo Creek. Currently an unsealed road provides access to the Rapid Creek beach and open area. There are a number of service tracks within the Reserve, some of which double as walking and cycling tracks.

Pedestrian and cycling access to the Reserve is via the pedestrian bridge over Rapid Creek, off Rocklands Drive, from the hospital precinct and along Lee Point Road. The path over the Rapid Creek bridge to Dripstone Cliffs is the most used cycle path in Darwin and is considered an arterial route by the Department of Transport.

Pedestrian access to Buffalo Creek is usually along the beach between Lee Point and Buffalo Creek. During high tides access along the beach can be difficult.

Air access currently consists of occasional helicopter landings on Casuarina Beach for special events such as weddings. There is no emergency helicopter landing site in the Reserve, however there is an emergency helicopter landing site located at the adjacent Royal Darwin Hospital.



Helicopters sometimes land on Casuarina Beach for special events

Issues

Many visitors cycle or walk to Lee Point using the shoulder of Lee Point Road. With the development of the Lyons and Muirhead subdivisions, vehicle traffic along this road is increasing and will continue to do so. This is a dangerous situation with the potential for a serious accident between walkers or cyclists and vehicles. While Lee Point Road is outside the boundary of the Reserve, the Parks and Wildlife Commission recognise this is a serious issue. The Parks and Wildlife Commission will liaise with the Department of Lands, Planning and Environment and City of Darwin to promote the development of a shared pedestrian and cycle path along Lee Point Road extending to Buffalo Creek with a shared path-cycle way similar to the one along Rocklands Drive.

Opportunities

The Experience Development Plan proposes sealing and fencing the existing dirt road which extends from the end of Dripstone Cliffs down to the Rapid Creek end of the Reserve. This will assist in reducing dust and illegal off road driving. It is also proposed to install a gate to enable vehicular access to be restricted to the Rapid Creek end of the Reserve, if required.

The Experience Development Plan proposes the development of a new walking track from Lee Point to Buffalo Creek including a bird hide. This track will enable visitors easier access to walk to Buffalo Creek when access is restricted due to high tides.

Management Actions

- The use of helicopters in the Reserve for special occasions will be permitted as long as it does not significantly impact on the Reserve's natural resources or other Reserve users.
- Work with the Department of Lands, Planning and Environment and City of Darwin to promote the development of a 3m wide sealed shared pedestrian and cycle path along Lee Point Road and extending to Buffalo Creek.
- Implement the Casuarina Coastal Reserve Experience Development Plan.

2.5 Visitor Sites

Key visitor sites in the Reserve include Dripstone Cliffs, Dripstone Park, Rapid Creek Open Area, Casuarina Beach (including the Free Beach), Lee Point and Buffalo Creek. Key activities undertaken at these sites are described in section 2.2 and proposed developments are described in the Experience Development Plan. Two sites requiring further explanation include the Free Beach and Buffalo Creek.

Casuarina Beach and the Free Beach

Casuarina Beach extends from Rapid Creek to Lee Point. The beach is very popular for walking (with or without a dog), undertaking wind powered activities, sunbathing, relaxing, playing in the rock pools and swimming.

One section of Casuarina Beach is known as the Free Beach. The 'Free Beach' is located 500 m from the car park at the end of Daribah Road and extends for 1 km along the beach in a north-easterly direction and for approximately 800 m seaward of the beach from the high tide mark. The Free Beach was declared in 1976 under the *Nudity Ordinance 1976* and is designated under the Schedule (Regulation 2) of the *Nudity Act 1980*. The Regulations under this Act "may declare that a secluded area is an area where nudity is permitted." It is the only 'Free Area' scheduled in the Northern Territory where nude sunbathing is permitted.

Facilities located toward the end of Daribah Road include a car park, toilet block and open shower. The section of beach adjacent to the Daribah Road car park is the site for the turtle hatchling releases.

Anecdotally, the Free Beach has earned a reputation as a 'must visit' place for some travellers and is favoured by many locals.

There have been instances of obscene or sexually lewd behaviour, generally associated with the old toilet block which was located near the entry to the Free Beach. This behaviour has caused concern for some regular visitors to the Reserve and has negatively impacted visitors. The old toilet block was removed in mid-2015 and a new one constructed out in the open, with good natural lighting. The new toilet block was designed to accommodate more people but through better siting and design, it is hoped that inappropriate behaviour will also be discouraged.

Issues

Since the declaration of the Free Beach in 1976, the northern suburbs of Darwin have grown considerably with the development of new subdivisions. With the expansion of housing in the area it is likely that visitor numbers to the Reserve will continue to increase with more families moving to the area.

Opportunities

The Free Beach is a long, uninterrupted section of beach which has the potential to accommodate a higher level of use than is currently occurring. Amending the domestic animal regulations for this section of beach to allow dogs off leads will enable more use of this section of beach (see section 2.6 Domestic Animal Regulations).

The Parks and Wildlife Commission work with NT Police and carry out joint patrols in the Reserve.

Management Actions

- Continue to work with the NT Police to coordinate enforcement provisions of the Nudity Act, particularly those relating to sexually lewd and obscene behaviour.
- Over the life of the Plan, review the suitability of the Free Beach giving consideration to the possible increased use of this section of beach from families living in the new housing estates of 2CRU and Muirhead North.

Buffalo Creek Area

The Buffalo Creek area includes a boat ramp, picnic area with gas barbeques, a toilet block, car and trailer parking and a secure car parking compound and kiosk. This site is mainly used by fishermen to launch boats into Buffalo Creek and out to the harbour.

The large sand spit at the tip of Buffalo Creek is used by fishermen and is also a favourite spot for birds and bird watching enthusiasts.

In the early 2000s, there were many reported incidents of theft and vandalism of vehicles left at the car park at the Buffalo Creek boat ramp. In response to this the secure car parking compound was constructed and a tender for the provision of 24 hour caretaker management services was awarded in 2009.

Issues

The current trailer parking space provided outside the secure compound is not adequate to cope with the number of trailers parked at this site during good tides and over weekends. It is not uncommon to see the secure compound almost empty while there are no free parking spaces available outside the compound. Trailer parking outside the compound is not well designed which limits the number of trailers that can be parked there.

Opportunities

Investigate alternative management possibilities for the future of the secure compound at Buffalo Creek including the possibility of it being managed by a fishing group.

Management Actions

- The future of the secure compound should be reviewed and alternative options investigated.

2.6 Domestic Animal Regulations

Outcomes

- The level of conflict between pet owners and other users of the Reserve is minimised.

The Reserve is a popular place for local residents to exercise not only themselves but their dogs and horses. As one of the few places in Darwin where dogs are allowed on the beach, the Reserve has always been popular for this purpose. A Community Survey conducted in early 2012 showed that 36% of visitors entered the Reserve with their dog.

The City of Darwin dog regulations apply within the Reserve and Rangers from the Parks and Wildlife Commission and City of Darwin undertake joint dog patrols. These patrols assist in raising awareness of the dog regulations and appropriate behaviour of dogs in the Reserve.

Visitors who bring their dog into the Reserve are also responsible for picking up after their dog and getting rid of the faeces so that it does not cause offence to other Reserve users. Dog owners are required to carry an appropriate container or bag to collect your dog faeces. Bins are provided in the Reserve to help pet owners clean up after their dogs.

The review of the 2002 Management Plan and the preparation of this Plan showed that elements of the 2002 domestic animal regulations were working, however some issues have been addressed to reduce conflicts and improve the visitor experience (see Figure 2).

The new regulations include:

No Dogs

Dog free areas within the Reserve include:

- the whole of Dripstone Park;
- the beach between Lee Point and Buffalo Creek (a distance of approximately 1.7 km) to protect the migratory shorebirds;
- the picnic area at Buffalo Creek; and
- the eastern picnic area at Lee Point.

Dogs on leads

Dogs may be exercised and brought into the following areas on a lead and under effective control:

- on the beach from the ramp for the disabled, just south of Dripstone Cliffs to the northern boundary of the Darwin Surf Life Saving Club (a distance of approximately 900 m);
- on the beach 100m on either side of Sandy Creek to protect the migratory shorebirds;
- in the grassed area of the Reserve adjacent to the Dripstone Cliffs car park;
- in the picnic area at the Rapid Creek end of the Reserve;
- the western picnic area at Lee Point;
- along all designated paths and tracks and in all car parks in the Reserve; and
- all other areas not specified in these regulations as areas where dogs and/or horses are permitted.



Dogs on a lead are permitted along all designated paths and tracks in the Reserve

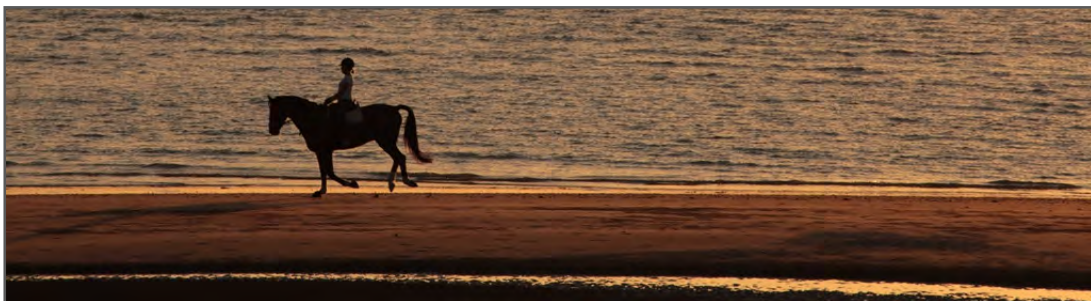
Dogs off leads

Dogs may be exercised and brought into the following areas off a lead, but under effective control:

- on the beach from the Rapid Creek footbridge to the disabled ramp, just south of Dripstone Cliffs (a distance of approximately 900 m);
- on the beach from the northern boundary of the Darwin Surf Life Saving Club to Lee Point (a distance of approximately 4.6 km). Along this stretch of beach, dogs should be under effective control. In particular, they should not be permitted in the dunes in order to protect turtle nests and special care should be taken to control dogs in the vicinity of Sandy Creek between October and March when waders are present; and
- on the Rapid Creek open area and the open area along Rocklands Drive.

Horses

Horses are permitted along the 'bridle' path that follows the eastern boundary of the Reserve adjacent to Rapid Creek from Trower Road to the beach and along the beach and in the sea between the mouth of Rapid Creek and the northern end of Dripstone Cliffs. Horses must only be ridden on the hard sand and in the sea to protect the foredunes and turtle nesting sites.



Horses are permitted in sections of the Reserve

Justification for Changes

The main changes to the regulations from those in the 2002 Management Plan include:

- Dogs on leads from the ramp for the disabled at Dripstone Cliffs to the northern boundary of the Darwin Surf Life Saving Club. The majority of this area was previously 'dogs off leads' however due to over-crowding along this section of beach, particularly on high tides, it is considered necessary to reduce conflict by making this a 'dogs on leads' area.

- Dogs off leads from the northern boundary of the Darwin Surf Life Saving Club to Sandy Creek. This area was previously 'dogs on leads' however this section of beach is not currently as intensively used as the southern end of the Reserve and can better accommodate dogs off leads. It has also become apparent that new visitors to the Reserve assume that this relatively empty section of beach is a dogs off lead area. This change means that visitors will now have a 4.6 km stretch of beach where visitors can have their dogs off a lead.
- Dogs on leads on the beach 100m on either side of Sandy Creek. Sandy Creek is recognised as an important site for resident and migratory shorebirds. To protect these birds, visitors will need to have their dogs on a lead 100m either side of the Creek. This will cause fewer disturbances to the birds while still allowing visitors to walk their dogs all the way to Lee Point. This is particularly important between October and March when the migratory shorebirds are visiting the Reserve.
- The open area along Rocklands Drive. Changing this area to dogs off leads allows the local residents the opportunity to exercise their dogs before entering the busier areas of the Reserve.

These changes still allow for a mix of uses in the Reserve. There are no time restrictions on the use of any of the dog or horse exercise areas within the Reserve. Information on appropriate dog behaviour and conditions for dogs off leads in the Reserve can be found at www.parksandwildlife.nt.gov.au.

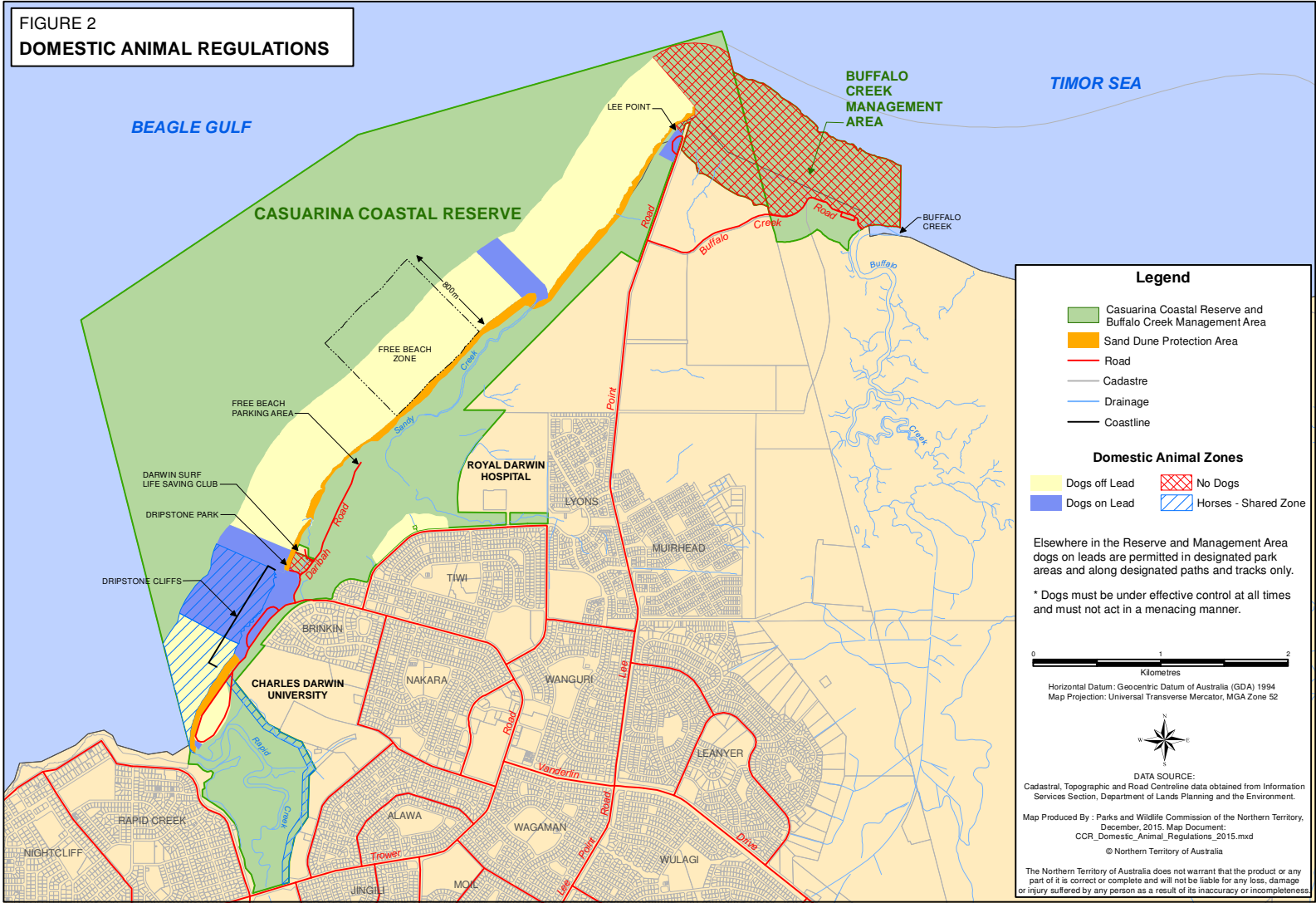
Future Review

As discussed in section 1.2, development of land neighbouring the Reserve for residential housing and tourist accommodation (2CRU and Muirhead North) could have significant impacts on the way the Reserve is used and managed. It will be necessary to monitor this increased use, in particular the stretch of beach from the start of the Free Beach zone to Lee Point, to ensure it is not negatively impacting the natural values or visitor enjoyment.

Management Actions

- Dogs and horses may enter the Reserve in accordance with the domestic animal regulations outlined above and in Figure 2 and in accordance with signs erected in the Reserve displaying the regulations.
- Continue to carry out joint dog patrols with officers from the City of Darwin to ensure compliance of the Domestic Animal Regulations and the Council dog regulations.
- Monitor the impact of increased visitor numbers as a result of the development of the proposed housing estate on Lots 4873 and 9370. If required amend the Domestic Animal Regulations to accommodate this increase.

**FIGURE 2
DOMESTIC ANIMAL REGULATIONS**



2.7 Visitor Safety

Outcome

- Public risk effectively managed resulting in very low incidence of injury to visitors.

Visitor safety is paramount in the management of the Reserve, however visitor accidents do occur and when they do it is important that the situation is handled quickly and effectively. The Parks and Wildlife Commission has an overarching Visitor Incident system that provides a basis on which to respond to emergencies. The Parks and Wildlife Commission also undertakes annual risk management assessments and specific risk mitigation activities are captured within operational action plans. All incidents are reported and the Commission has a range of Work, Health and Safety (WHS) and hazard reduction guidelines to which the Commission adheres. The effective implementation of this system requires sufficient resources and trained, competent staff.

There are some areas in the Reserve where lighting could be improved to better ensure visitor safety. These areas are identified in the Experience Development Plan.

Saltwater Crocodiles, Stingers and Unsafe Beach Conditions

Swimming at Casuarina Beach, Rapid Creek, Sandy Creek and Buffalo Creek is not recommended at any time of the year due to the likely presence of saltwater crocodiles and stingers. Saltwater crocodiles (*Crocodylus porosus*) occur and visitors are warned of their presence through pre-visit information and on-site signage. The Parks and Wildlife Commission maintains a Crocodile Management Plan for the Darwin Harbour which includes the Reserve. This Plan is reviewed as required.

Stingers (box jellyfish, *Chironex fleckeri*) occur in the waters of the Reserve and are generally present between October and May however, they can occur all year. Visitors are warned of their presence through signage and safety information.

The sea along Casuarina Beach can become very rough during the Wet season. Storms, cyclones and monsoonal weather can make the beach unsafe.



Safety information is provided in the Reserve

Illegal camping and Itinerants

Camping is not permitted in the Reserve. Itinerants regularly camp in the Reserve sometimes taking over picnic shelters in Dripstone Park and Lee Point but they also camp in the bush away from public areas or on the beach. Backpackers also regularly camp in the Reserve. In most cases, illegal campers are quickly removed from the Reserve. Sometimes the size of the groups and their aggressive behaviour makes it difficult and dangerous for Rangers to remove people. In these cases, the Police may be called in to assist in removing illegal campers. Regular patrols are conducted by Park staff and the Police.

Anti-social behaviour

Anti-social behavior, due to public drunkenness is often associated with illegal camping and itinerants. Rubbish, aggressive behaviour, fighting, defecating and urinating in public and disturbance and harassment of other users are some of the problems associated with public drunkenness in the Reserve.

From 1993 to 2003, the Reserve was covered by an exemption under the *Summary Offences Act* which allowed for alcohol to be consumed within a 2 km radius of a licenced premise. In 2003, in response to a

management action in the previous Management Plan to reduce anti-social behaviour, this exemption was cancelled. This allowed for restrictions on the consumption of alcohol to be put in place across the Reserve. Alcohol may now only be consumed at Dripstone Cliffs, Dripstone Park and Lee Point picnic areas between the hours of 4pm and 10.30pm Monday to Friday and 12 noon to 10.30pm on weekends and public holidays.

Theft and Damage to Property

Theft and damage to property is a problem in many public places across the Northern Territory including the Reserve. A number of signs warning people to secure their cars and not to leave valuables in view have been erected in parking areas in the Reserve. The Parks and Wildlife Commission may consider installing security cameras to assist in reducing theft and damage to property in the Reserve, if funding becomes available.

Rangers and Police will continue to carry out patrols to manage illegal camping, itinerants and to reduce anti-social behaviour, theft and damage to property in the Reserve.

Asbestos Management

Fragments of asbestos-rich building materials have been periodically found on Casuarina Beach. They appear on the surface because tides and storms periodically rework the beach sands. They largely date from post-Cyclone Tracy clean-ups and earlier inappropriate waste management methods. The Parks and Wildlife Commission has an Asbestos Management Plan which outlines the steps required to manage asbestos.

Management Actions

- The Experience Development Plan proposes improvement to visitor safety through the installation of lighting in appropriate locations across the Reserve.
- Regularly liaise with the Police and Night Patrol to coordinate enforcement in the Reserve, particularly in relation to anti-social behaviour and illegal camping. All staff will be familiar with and trained on the safety procedures. Park staff will work closely with Police, Fire and Emergency Services and Bushfires NT during safety incidents and when required.
- Implement the Darwin Harbour Crocodile Management Plan and review the Plan as required.
- Implement the Parks and Wildlife Commission's Asbestos Management Plan and remove asbestos as required.

2.8 Visitor Information, Interpretation and Monitoring

Interpretation enhances the enjoyment of visitors and locals and provides an avenue for learning and appreciation of the natural and cultural values of the Reserve. It is essential to provide up to date and interesting information. The Reserve currently provides two forms of interpretation including interpretive signage and Ranger-guided walks and talks. Rangers, community members and volunteers can play an important role in enhancing the awareness of visitors and locals to the Reserves values.

Casuarina Coastal Reserve currently lacks a sense of arrival and sense of ownership. Due to the many entrances to the Reserve, many visitors are unsure when they have entered and who is responsible for the management of the Reserve. Providing visitors with a clear and strong sense of arrival as they enter Casuarina Coastal Reserve can enhance the experience and can engender a sense of stewardship and passion for the Reserve.

The Experience Development Plan proposes improving the sense of arrival and ownership through the installation of two large entry signs at Dripstone Cliffs and Lee Point. The Parks and Wildlife Commission will work with the relevant Government department to develop a signage plan for the main roads leading to the Reserve (e.g. Trower and Lee Point Roads).

Directional signage is an important element to ensure visitors have a safe and relaxing visit. The Parks and Wildlife Commission will continue to review and improve the directional signage in the Reserve. Good visitor information that shapes visitor expectations and behaviour will assist in reducing incidence of injury to visitors.

Walking track signage and interpretation in the Reserve could be improved to enhance the visitor experience.



Interpretive signs can enhance the visitor experience

Visitor Monitoring

In early 2015, four vehicle traffic counters were installed in the Reserve. These counters will provide quantitative information. The collection of qualitative information such as visitor satisfaction, profile and use of the Reserve is also important information. Visitor monitoring is essential in improving knowledge and understanding of visitor behaviour. It helps improve park management and is necessary for conserving values of the Reserve.

Management Actions

- Investigate opportunities for community members and volunteers to assist in providing interpretation in the Reserve to enhance the visitor experience.
- Implement the Experience Development Plan to improve the sense of arrival through the installation of two large entry signs at Dripstone Cliffs and Lee Point.
- Work with the relevant Government department to develop a signage plan for the main roads leading to the Reserve.
- Review and upgrade directional signage to ensure visitors are able to locate Park facilities.
- Improve track signage and markers.
- Carry out visitor surveys approximately every three years in accordance with the Parks and Wildlife Visitor Monitoring Program.

2.9 Litter and Waste

Outcome

- A clean and tidy Reserve.

As the NT's most visited park or reserve, a lot of visitor waste is generated. There are approximately 25 rubbish bins in the Reserve but not all the litter finds its way into them. Rangers conduct regular patrols of the picnic areas and walking tracks and also the beach but some discarded items go unnoticed. These can pose a risk to public safety and also wildlife. Discarded plastics, aluminium cans and glass containers are particularly hazardous.

Much of the litter and waste not placed in bins and left in the Reserve finds its way to the beach and the sea. Large piles of rubbish, comprised largely of wrappings or spent firework casings, are left behind after Territory Day celebrations. A targeted response is required by Rangers, sometimes in association with Larrakia Aboriginal rangers and also Corrections personnel. Regular local clean up events are conducted by local community groups, e.g. Clean Up Australia Day, Darwin Harbour Clean-Up.

There are many Reserve users who regularly undertake their own voluntary litter patrols. Their efforts make a big difference along creek lines and in bushland areas.

There are presently no recycling points provided in the Reserve, and, if provided this could assist in reducing rubbish left in the Reserve.



Rubbish dumped in the Reserve can be harmful to wildlife

Management Actions

- Continue regular litter patrols
- Maintain support of local community groups conducting regular clean ups
- Replace old bins and provide recycling points
- Educate visitors about the dangers and hazards of litter through ranger interaction and postings on the Parks and Wildlife facebook page.

3.0 Involvement in the Reserve

Outcome

- A highly engaged community that is supportive of the Reserve and actively involved in its management.

Ultimate responsibility for management of the Reserve rests with the Parks and Wildlife Commission however there are a number of stakeholders with interests in its management. The largest user group is the local community. Local community involvement in management of the Reserve can include passive and / or active involvement.

The involvement of the local community in managing the Reserve can benefit the community, the Parks and Wildlife Commission and the Reserve values. Some benefits include increased community support, additional resources, and opportunities for individuals and groups to serve the community and increase knowledge and skills. Many Reserve users do not want to be involved in management programs however they do want to remain informed about management. There is a need to engage all stakeholders, including businesses and visitors, in order to maintain support for the Reserve.

Volunteering is another way to involve the community, it can be a very rewarding experience for all those involved and can help achieve management objectives. Volunteering activities are most successful when they form part of structured programs developed in close consultation with Parks staff.

The Reserve is used for many purposes by different stakeholders ranging from community groups, schools, Charles Darwin University and environmental groups to sporting clubs. Key stakeholders include the Casuarina Coastal Reserve Landcare Group, the Darwin Surf Life Saving Club, the NT Field Naturalists Club, the Top End Native Plant Society, the Darwin Off-Road Cycle Club, Equestrian NT, Darwin Dressage, Hash House Harriers, Top End Orienteering, Rapid Creek Landcare Group, just to name a few. It is important for the Parks and Wildlife Commission to work closely with these stakeholders to support multiple and varied uses of the Reserve.

Casuarina Coastal Reserve Landcare Group

The Casuarina Coastal Reserve Landcare Group is a committed group of local residents who volunteer their time to assist the Parks and Wildlife Commission in protecting and enhancing the natural values in the Reserve. The Group holds regular working bees and community planting days. They have been actively involved in the Reserve since 1997.

To recognise the contribution this Landcare Group makes to the Reserve, and ensure a shared understanding and positive working relationship, an informal Memorandum of Understanding (MOU) has been prepared between the Group and the Parks and Wildlife Commission. The MOU defines the key principles and priorities to maintain a positive and robust relationship and outlines the key projects the Group will undertake and the support the Parks and Wildlife Commission will provide.



The Casuarina Coastal Reserve Landcare Group at work in the Reserve

Casuarina Coastal Reserve Advisory Committee

In July 2011, the Parks and Wildlife Commission established the Casuarina Coastal Reserve Advisory Committee. The purpose of this committee was to provide input from a wide range of community members and key stakeholders into development of a new Management Plan and the development of visitor facilities and services, among other matters.

The original committee comprised representatives from the community, recreational users, environmental interests, City of Darwin, the Darwin Surf Life Saving Club, the youth, Larrakia people and the Parks and Wildlife Commission. Since its establishment, the composition of the Committee has changed to a core group representing various interests, however all are passionate about the Reserve.

The Committee meets as required and has provided essential input into the development of this Plan. The Committee had an expected life of three years, however this was extended while this Plan was prepared.



The Casuarina Coastal Reserve Advisory Committee undertaking a site visit in the Reserve

Aboriginal Involvement and Use

The Larrakia people remain the custodians of sacred sites and sites of significance within the Reserve. Larrakia people have an interest in the management of Reserve values and have attended Casuarina Coastal Reserve Advisory Committee meetings.

The Larrakia people are also involved in management through casual employment by the Commission. The Larrakia Rangers² have carried out such tasks as weed spraying, construction of boardwalks and fences and planting of seedlings. Where possible, the Commission will continue to employ Larrakia Rangers in Reserve management activities.

Management Actions

- Upon completion of the development of this Plan, review the purpose of the Committee and determine the best available strategy for community input into management of the Reserve.
- Continue to work closely with community groups and establish new partnerships to assist in management and to improve and enhance the user experience.
- Provide opportunities for Larrakia Rangers to work in the Reserve.

² Larrakia Aboriginal Rangers are employed by the Larrakia Nation Aboriginal Corporation and funded by the Australian Government. They work on projects throughout their traditional lands and areas around Darwin.

4.0 Managing Natural Values

Outcomes

- The protection of the Reserve's key natural values including dune system, woodlands, monsoon forest, beaches and the marine environment; and
- The protection of significant fauna including migratory birds and shorebirds, turtles and other marine fauna.

As stated previously, Casuarina Coastal Reserve is a Class 1 (most important) Visitor park and a Class 3 Biodiversity park. Class 3 parks for biodiversity values require management of the Reserve to protect identified, usually limited and site-specific conservation values. These specific conservation values are identified in this section.

Casuarina Coastal Reserve does not contain habitats / natural values of national or Territory significance. The Reserve's biodiversity is very important to the local community and visitors as it underpins the importance of the area for recreation and it is the natural values which give the Reserve its character. The Reserve's natural values also provide an excellent opportunity to educate locals and visitors alike. The natural values are also very significant at a local level, where natural habitat is diminishing rapidly. As a result, the conservation program for the Reserve will focus on community benefit and participation.

Darwin Coastal Bioregion

The Reserve falls within the Darwin Coastal bioregion which extends from the Fitzmaurice River in the south west to Murgarella in the east (Thackway and Creswell, 1995). This bioregion is characterized by flat, low-lying country, drained by several large rivers. The vegetation communities include eucalypt forest and woodlands. The Reserve represents less than 1% of the reserved area in the Darwin Coastal bioregion but the bioregion, as a whole, is well reserved with more than 31.5% protected in parks and reserves including parts of Kakadu and Litchfield National Parks.

The Darwin Foreshore

The Darwin Foreshore area stretches from Bullocky Point in the south to Buffalo Creek in the north, encompassing the whole of Casuarina Beach. The Darwin Foreshore area is listed on the Register of National Estate (as a non-statutory archive). This area is important for both its natural features and cultural values. The natural features include a significant variety of coastal landforms and ecosystems. 160 species of sponge and 63 species of shrimp have been recorded at East Point and it is likely that the reef of Lee Point has a similar diversity of sponges and shrimps (Australian Heritage Database, 2014).

Cretaceous siltstone reefs within the tidal zone off Casuarina Beach contain Ichthyosaur fossils and well preserved fragments of fossilised wood. Largely isolated Ichthyosaur and Plesiosaur elements were recovered from the shallow marine, continental margin deposits of the Darwin Formation at Casuarina Beach, Fannie Bay and Nightcliff (Kear B, 2003).

Sites of Conservation Significance

Sites of Conservation Significance (SOCS) are those areas containing special biodiversity values. They are classified according to their value for threatened species, aggregations of wildlife, wetlands, endemic species and botanical significance. The NT Government has identified 67 of the most important sites for biodiversity conservation in the Northern Territory. The recognition of these sites imposes no additional regulatory or legislative requirements over the land, over and above any particular existing requirements of the area. This Plan acknowledges the classifications of Harrison et al (2009) in their assessment of SOCS.

A small portion of Casuarina Coastal Reserve (0.3%) and Buffalo Creek Management Area (0.7%) occur within the Shoal Bay SOCS. Shoal Bay SOCS is of international significance and is proposed to be nominated by Birdlife Australia as an internationally recognised *Important Bird Area* due to the occurrence of Chestnut Rails (*Eulabeornis castaneoventris*) and globally significant numbers of Great Knots (*Calidris tenuirostris*) which is listed as vulnerable on the IUCN Red list. Buffalo Creek and Lee Point support nationally significant numbers of Red Knot (listed as vulnerable), Eastern Curlew (vulnerable), and Greater Sand Plover (vulnerable). The Chestnut Rail is a range restricted species that has been recorded in the mangroves at Buffalo Creek and the Great Knot is regularly recorded along the beach between Lee Point and Buffalo Creek. The Shoal Bay SOCS is identified as an internationally important site for migratory shorebirds in the East Asian Australasian Flyway (Harrison et al 2009 and Chatto R. 2003).

4.1 Landforms, Estuarine and Marine Environments

The main coastal landforms in the Reserve include intertidal sandflats, offshore reefs, dune, beach ridges, estuarine fringes and waterways including Sandy, Rapid and Buffalo Creeks. These creeks are tidally influenced and include mangroves and salt tolerant vegetation. The intertidal sandflats provide habitat for marine invertebrates, migratory waders and turtles. This area also receives the highest level of visitor use in the Reserve.

Darwin Harbour, between Charles Point and Lee Point, is managed to maintain the following beneficial uses; Aquatic Ecosystem Protection and Recreational Water Quality and Aesthetics. Beneficial Uses are declared under section 73(1) of the *Water Act*. The management of water resources in the Reserve is consistent with the declared beneficial uses.

Interesting geological features in the Reserve include the eroded siltstone cliffs and caves (Dripstone Cliffs and Dripstone Caves) and fossil deposits located within the bedrock of some of the Reserve's offshore reefs. The Reserve contains reefs located off Lee Point and north of Rapid Creek. The large reef located north of Rapid Creek is known as Darriba Nungalinya (Old Man Rock) and is a registered sacred site. At extremely low tides the sandflats, the off-shore reefs and Old Man Rock are exposed.

The whole of the Reserve, with the exception of Dripstone Cliffs and Dripstone Caves, is located within the primary or secondary storm surge zone. The foredunes receive the full impact from storm surges or major storm activities and are, therefore, more likely to be impacted by these events. The dune and beach ridges are highly susceptible to disturbance from foot and vehicle traffic and weather events such as cyclones and storms. Boardwalks have been installed throughout the Reserve to protect the foredunes from unrestricted access. These access boardwalks are often damaged through storm surges and storm activities. Limiting access on the foredunes assists in their protection.

The soils and dunes in most of the Reserve are highly susceptible to disturbance and erosion where vegetation cover is removed, along drainage lines and in areas influenced by storm activity such as foredunes. Disturbance can also be caused by unregulated visitor activities and wildfires. In addition the design and siting of visitor facilities is undertaken to ensure such developments do not cause erosion or damage other values of the Reserve.

The Reserve contains at least two types of seagrass, *Halodule uninervis* and *Halophila ovata*. The Flora and Fauna Division of the Department of Land Resource Management advise that recent seagrass surveys of Darwin Harbour have shown that Casuarina Coastal Reserve contains the most significant seagrass meadow in Darwin Harbour (Griffiths. T. 2014 pers com). These seagrass meadows provide habitat and a food source for marine fauna including dugongs and green turtles.

With assistance from Park Rangers, Flora and Fauna Division staff, from the Department of Land Resource Management, carry out annual monitoring of seagrass in the Reserve in November and December during very low tides. New technology using cameras is being investigated. If adopted it will enable more regular monitoring and assist in gaining a better understanding of the extent of the seagrass communities.

The greatest threat to seagrass is poor water quality. The Reserve contains several drains which are fed from the neighbouring suburbs, the hospital precinct and Charles Darwin University. These drains, if not designed correctly or maintained, can create erosion, sedimentation or pollution. These unwanted processes can have a negative impact on the coastal marine environment.



Rangers assisting the Department of Land Resource Management staff with seagrass monitoring

It is important for the Parks and Wildlife Commission to work closely with the Department of Lands, Planning and Environment and developers to ensure that the siting and design of any drains from new housing estates into and through the Reserve does not impact on water quality and erosion and sedimentation are minimized.

Water quality in the Darwin Harbour is managed through the Darwin Harbour Water Quality Protection Plan (WQPP). The aim of the WQPP is to ensure that objectives are maintained and that the community's values for waterways are protected. The WQPP is an action plan developed under the National Water Quality Management Strategy and funded largely by the federal government.

Water quality and the health of Darwin Harbour is monitored extensively by the Department of Land Resource Management (DLRM, 2012). Report cards outlining the results are prepared for specific locations across the Harbour including the Buffalo Creek estuary. The 2012 report cards showed that Darwin Harbour's water quality is generally in good to excellent condition. The water quality of the upper reaches of the Buffalo Creek estuary, however is rated as being very poor while the lower reaches are rated as poor condition.

Buffalo Creek estuary is subject to treated water discharge in the upper reaches from the Leanyer-Sanderson sewage treatment plant. Treated water has been discharged into Buffalo Creek since 1971. A detailed report prepared on the water quality in the Buffalo Creek estuary recommended further intensive monitoring is needed to help evaluate the current state of the estuary and potentially act as a benchmark for future improvements or remediation in the estuary (NRETAS, 2010). A program is being run in the estuary by the Australian Institute of Marine Science and Charles Darwin University for shellfish monitoring and assessment of micro-pollutants.

In 2011, three Darwin Harbour beaches, including Casuarina, Lee Point and Rapid Creek Beaches, were closed on one occasion (and two occasions for Rapid Creek Beach) due to high levels of bacteria in the water. As a result of these closures, water testing for microbiological indicators was undertaken across a number of sites, including the Buffalo Creek estuary, by the Department of Natural Resources, Environment, the Arts and Sport and Power and Water Corporation. No links were found between the water in the Buffalo Creek estuary and the beach closures. The findings in the Buffalo Creek estuary were that the risk to public health was considered low given that the area was typically not used for public swimming or primary contact (DRLM 2014). Potential pollution sources causing the high levels of bacteria at these beaches were identified to be sediment, nutrient, bacteria, commercial and other human-related pollutants in stormwater run-off from rural, urban and diffuse sources in the catchment (NRETAS, 2011).

Management Actions

- Regulate visitor access across the dunes to minimise damage to dunes and beach ridges.
- Work with the Department of Lands, Planning and the Environment and developers to ensure that drainage into and through the Reserve does not impact on water quality and erosion and sedimentation are minimised.
- Design and locate new infrastructure with consideration to potential environmental impacts including erosion.
- Develop and implement an Erosion and Drainage Plan (see section 2.3).
- Continue to assist scientists within the Department of Land Resource Management to undertake annual seagrass monitoring and water quality monitoring, where possible.

4.2 Flora

There are about 273 native plant species recorded in the Reserve, including two threatened flora species (*Cycas armstrongii* and *Stylidium ensatum*) (DLRM, 2014). The Reserve supports a wide variety of coastal habitats that are typical of the Top End.

In 1996, Greening Australia surveyed and described 17 vegetation communities in the Reserve (DIPE, 2002). The main vegetation communities include monsoon vine forest, mangrove, eucalypt woodlands, paperbark (*Melaleuca*), grassland and pandanus communities. Wildfire presents the greatest threat to these communities and is discussed further in section 4.5.

Vegetation in some parts of the Reserve is the result of management actions, such as the plantings of natives specifically *Casuarina equisetifolia* and *Spinifex longifolius* to help stabilise the dune system and *Acacia auriculiformis* to stop erosion and to provide shade.

As mentioned in section 3.0, the Casuarina Coastal Reserve Landcare Group assists the Parks and Wildlife Commission in maintaining and improving the natural values of the Reserve. The Landcare Group undertakes land management activities including weed control and re-vegetation works. The Casuarina Coastal Reserve Landcare Group and the Parks and Wildlife Commission have been working together for many years and have signed a Memorandum of Understanding (MOU). The MOU recognises that the Group will work with the Parks and Wildlife Commission to contribute to the maintenance and improvement of the natural values of the Reserve. It also recognises the importance of this partnership and defines key principles and priorities to maintain a positive and robust relationship.

Management Actions

- The Reserve's floral diversity will be protected through fire and weed management programs integrated through annual operational plans.
- Continue to work with and support the Casuarina Coastal Reserve Landcare Group through the implementation of the Memorandum of Understanding.

4.3 Fauna

There are about 266 native vertebrate species recorded in the Reserve, including at least 10 threatened fauna species (DLRM, 2014). The Flatback turtle (*Natator depressus*) is listed as data deficient within the NT and the Olive Ridley (*Lepidochelys olivacea*) is now listed as vulnerable within the NT and under Commonwealth legislation. Other notable fauna include dolphins, dugong, waders, crocodiles, other marine turtles and potentially some invertebrates.

Of interest in the Reserve is the presence of the orange-footed scrubfowl (*Megpodius reinwardt*), Lewin's Rail (*Rallus pectoralis*) and Chestnut Rail (*Eulabeornis castaneoventris*). The Reserve is one of the few known breeding locations for the yellow spotted monitor (*Varanus panoptes*). The Australian Bockadam (*Cerberus australis*) also occurs in the Reserve and is a harmless snake generally found in mangroves, mudflats and creeks and mainly feeds on fish. The Reserve is also visited regularly by a bat colony.

Also recorded in the Reserve are about 60 species of fish and 669 species of molluscs (NRETAS, 2010).



The Australian Bockadam is found in the Reserve

Migratory Birds

Approximately 213 species of birds have been recorded in the Reserve. Lee Point, Sandy Creek and Buffalo Creek are recognised as nationally and internationally important sites for migratory and resident shorebirds (Chatto R. 2003). These sites are used for feeding and roosting by shorebirds. Counts in the Lee Point area have revealed more than 9000 shorebirds roosting there at high tide, comprising nearly 30 species, making this an important shorebird area especially over the Wet season when the shorebirds escape the northern hemisphere winter (Kyne P, 2010).

The migratory shorebirds that use the Reserve are protected under several bilateral agreements including the Convention of Migratory Species of Wild Animals (Bonn Convention), Japan-Australia Migratory Bird Agreement (JAMBA), China-Australia Migratory Bird Agreement (CAMBA) and Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Some of these migratory species travel enormous distances, for example the Eastern Curlew (*Numenius madagascariensis*), the largest shorebird in the world at over 900g and breeds in far east Russia and Mongolia and travels to northern Australia. The Red-necked Stint (*Calidris ruficollis*) is the smallest shorebird at 30g and breeds in northern Siberia and is common and abundant along the beaches in the Reserve.



Barrier fencing to raise awareness of visitors to the presence of roosting sites

Park staff regularly work with the Darwin-based NT Field Naturalists Club and interested bird watchers to raise awareness in the community of the importance of these sites and the significance of these birds. A discussion in late 2013 with these groups, led to the Commission fencing an area of the Lee Point beach within the no dog zone. This fencing is not intended to stop visitors accessing the beach but to make people aware they are entering an important migratory and shorebird site and to take care.

In 2014, the Australian Shorebird Conference was held at adjoining Charles Darwin University. During this conference several individual birds were fitted with legflags so their movements can be monitored on our beaches and on their stopovers along the East Asian-Australasian flyway.

The greatest threat to these shorebirds while on non-breeding grounds through disturbance and predation. While Lee Point beach east to Buffalo Creek is zoned no dogs, there are some visitors who ignore the zoning and take their dogs into this area. Dogs chasing the birds mean they are required to fly off to get away from the dogs. If they are frequently disturbed the birds become tired and stressed and this can impact the health of the bird. A study through Charles Darwin University has been undertaken on feeding and habitat use of migratory birds. The report states, 'Disturbances to shorebirds can cause birds to use energy that they would normally use on other activities. Disturbances may reduce energy reserves to below levels that can be replenished by normal daily intake rates' (Lilleyman A. 2012). Information from this study may assist in determining ways to better manage visitors and use of Lee Point and Buffalo Creek to better protect the migratory birds.

Turtles

Flatback (*Chelodina depressa*), Olive Ridley (*Lepidochelys olivacea*) and Green turtles (*Chelodina mydas*) are known to use Casuarina Beach and the waters of the Reserve. These marine turtles are listed on the Bonn Convention for the Protection of Migratory Species of Wild Animals and Marine and Migratory under the Commonwealth *Environment and Protection Biodiversity Conservation Act*.

As mentioned in section 2.0, Flatback, Green and occasionally Olive Ridley turtles nest on Casuarina Beach. The number of nests varies each year. In order to protect the eggs, Parks and Wildlife Commission staff, when necessary, relocate the nest to a safe location. After monitoring for 45 days, the hatchlings are removed prior to emerging. This is done to protect the hatchlings and it also provides an excellent public education opportunity when the public are invited to assist in releasing these hatchlings to the sea.

Injured turtles, dugongs and whales are occasionally found on the beach in the Reserve. The public often assists the Parks and Wildlife Commission by reporting the locations of these animals enabling the animal to, when possible, be rescued, rehabilitated and released.

Visitors often assist the Parks and Wildlife Commission in protecting fauna through reporting sightings of turtles hatchlings and injured fauna, particularly injured marine fauna.



Visitors assisting staff with the rescue of a Green turtle in March 2014



Management Actions

- Continue to work with local groups to encourage public awareness of the importance of the Reserve to resident and migratory shorebirds.
- Continue to promote public awareness of the turtles nesting in the Reserve and the benefits of reporting sightings of turtle hatchlings, injured turtles and injured fauna.

4.4 Research and Monitoring

Knowledge of the Reserve's natural resources and an understanding of changes taking place over time can assist in managing these resources. Scientific research has been undertaken in the Reserve over the years, however there is still more that can be learnt about the natural values and how these values are affected by human activities.

Research and monitoring is carried out by the Flora and Fauna Division in the Department of Land Resource Management, other government agencies and individuals. People who wish to take or keep protected wildlife must be issued with a permit under the *Territory Parks and Wildlife Conservation Act* or the By-laws.

A small mammal survey was carried out in the Reserve in January 2014. This was part of a larger project looking at the impacts of cats on small mammal populations. No small mammals were physically trapped during this survey. A second stage of the project was the installation of cameras in the Reserve for a period of four weeks. The footage from these cameras captured sightings of the Northern Brown Bandicoot (*Isodon macrourus*), Brushtail Possum (*Trichosurus vulpecula*) and Black-footed Tree-rat (*Mesembriomys gouldii*) (vulnerable under the *Territory Parks and Wildlife Conservation Act*). As it is not always possible to trap these animals, these sightings at least indicate their presence in the Reserve.

The Reserve is located in the northern suburbs and neighbours Charles Darwin University. Opportunities exist to develop research partnerships and encourage the Reserve to be used for research purposes with Charles Darwin University, schools and CSIRO.

Management Actions

- Establish research partnerships with education / research institutions to support research programs across the Darwin Parks Region, including Casuarina Coastal Reserve.

Connecting Corridors of Green

Casuarina Coastal Reserve is one of eight sites across Darwin involved in *Connecting the Corridors of Green: A United Urban and Peri-Urban Landcare Approach for Darwin Harbour*. This was a Commonwealth Government Biodiversity Fund project over 2011 to 2014. It has resulted in an on-going partnership between the Parks and Wildlife Commission, the Casuarina Coastal Reserve Landcare Group, Conservation Volunteers Australia and Greening Australia. The purpose of this project is to:

- protect, restore and revegetate significant vegetation communities;
- maintain and enhance biodiversity by managing threats to these communities;
- reintroduce in appropriate locations the Atlas Moth (*Atticus wardii*), through habitat enhancement; and
- facilitate improved long term landscape scale management and connectivity by bringing together land owners / managers, stakeholders and the community to strategically manage threats to key biodiversity values within the urban and peri-urban areas.

The project site is approximately 10.6 ha in area and is located off Rocklands Drive. Through the *Corridors of Green* project, the Casuarina Coastal Reserve Landcare Group and the Parks and Wildlife Commission are continuing work with support from local residents to:

- manage weeds and fire within the project area;
- encourage re-introduction of the Atlas Moth through planting of the host plants, *Croton habrophyllus* and *Litsea glutinosa* (to be coupled with research and monitoring); and
- protect habitat for the long-term survival of local flora and fauna.

The Atlas Moth is listed as endangered under Northern Territory legislation and has only been recorded from four areas in the Top End – Darwin, Black Point on the Cobourg Peninsula, Melville Island and, recently, Dundee Beach. While it has not been recorded in Darwin for 100 years, places such as East Point and the project site in the Reserve provide the most likely habitat for it to occur. By enhancing and protecting the habitat at the project site, the re-introduction of the Atlas Moth may be possible into the future.

While funding for the project ceased in 2014, the Casuarina Coastal Reserve Landcare Group is maintaining and improving the natural values of the site. There is potential for the formation of an Atlas Moth Reintroduction Group which, if successful, would use this site in the Reserve.

Management Actions

- Continue to work with the Casuarina Coastal Reserve Landcare Group to manage the project site for weeds and fire with the long-term aim to promote the reintroduction of the Atlas Moth. Works undertaken will include:
 - mowing, slashing and spraying of weeds within and adjacent to the project site;
 - prescribed burning as required within and adjacent to the project site;
 - holding community events adjacent to the project site to promote community engagement and involvement in the project; and
 - assisting with research.

4.5 Managing Threatening Processes

Threatening processes, particularly fire and weeds impact on all elements of the Reserve from biodiversity through to visitors, their safety and experiences. The greatest threat to the natural values of the Reserve is frequent, high intensity late Dry season wildfire.

Casuarina Coastal Reserve is the most visited park or reserve in the Northern Territory. As a result, threatening processes need to be managed not only to protect the Reserve's natural values but also to protect visitor safety and infrastructure and ultimately visitor enjoyment. It is important to find the balance between management of biodiversity and visitor safety. Currently management for visitor safety and protection of visitor infrastructure takes precedence over managing for biodiversity.

The small size of the Reserve and its many neighbours means there is potentially more risk of threatening processes entering and impacting on the natural values of the Reserve. It is important to work closely with neighbours to minimise these potential impacts.

Key threatening processes to be managed include fire, weeds, feral animals, mosquitoes and water quality. Water quality is dealt with in section 4.1.

Fire

Wildfire is a frequent occurrence in the Reserve and generally the result of arson, unattended campfires or from fireworks (as part of Territory Day celebrations). Too frequent wildfire can have a devastating effect on vegetation in the Reserve. Fire management is, therefore, focused around trying to minimise the impact of wildfire on the Reserve and in particular the vegetation on the sand dunes, the area managed by the Casuarina Coastal Reserve Landcare Group and the Casuarinas growing along the foreshore.

Fire management in the Reserve is carried out through: maintaining firebreaks (slashing, grading, rolling or herbicide treatment); slashing and mowing around infrastructure; and, carrying out controlled burning of specific areas targeted by annual action plans. Park staff carry out prescribed controlled hazard reduction burns at the end of the Wet season and in the early Dry season in order to protect key assets, specific habitats and infrastructure from wildfire. Specifically, these areas include sensitive habitat on and behind the dunes, the fringes of deciduous monsoon vine forests and areas near revegetation sites. Woodland behind the Royal Darwin Hospital, Brinkin and at Lee Point is also targeted.

Many of the wildfires in the Reserve occur outside business hours, so the Northern Territory Fire and Emergency Services (NTFES) are generally the first presence on-site and assume control of fire-fighting activities. Rangers assist NTFES whenever possible.

Fire is managed according to priorities in the Reserve's Fire Action Plan. This Plan is developed by the Parks and Wildlife Commission with input from key stakeholders, NTFES and Bushfires NT. When undertaking controlled burns in the Reserve, the Parks and Wildlife Commission is required to obtain a permit under the *Fire and Emergency Act* from the NTFES.

Fire management is carried out in the Reserve for the following reasons, in order of priority:

- protection of public safety / amenity;
- protection of property / infrastructure; and
- protection of biodiversity (including as a form of weed management).

Protection of Public Safety and Public Amenity

An important element of fire management in the Reserve is public safety and public amenity. Not only can fires be a danger to visitors in the Reserve, the smoke from fires can also be hazardous to road users in neighbouring suburbs and a nuisance to nearby residents. Therefore, fire management in the Reserve also aims to mitigate smoke impact on users and neighbours.

Mandatory firebreaks, as required under the *Bushfires Act*, are established around the Reserve boundaries to protect both the Reserve and the neighbouring properties (e.g. Brinkin). There are also a number of internal firebreaks to protect visitors and Reserve infrastructure.

Protection of Property / Infrastructure

Fire management is required to protect property and infrastructure in the Reserve including visitor infrastructure and historical and cultural sites of significance (e.g. WWII Observation Posts).

Protection of Biodiversity

Fire management in the Reserve is also carried out to protect fire-sensitive vegetation from wildfires including Casuarinas, monsoon vine thicket and dune habitat. Hazard reduction burns are used to manage grassy weeds such as Gamba grass, resulting in further protection and enhancement of biodiversity.

Management Actions

Prepare an annual Fire Action Plan in collaboration with Bushfires NT and the Northern Territory Fire and Emergency Services (NTFES). The Fire Action Plan will focus on:

- Strategic firebreaks – Networks of strategic firebreaks will be created or reinforced through interconnection with natural or other firebreaks. Other firebreaks will be created to protect fire-sensitive vegetation, infrastructure, significant sites or neighbouring properties.
- Patch-burning – Low intensity scattered patch-burning of ground fuels will be implemented where appropriate to create a mosaic of habitat succession.
- Infrastructure – Mechanical, chemical and fire control of fuel loads around infrastructure in priority visitor areas will be undertaken.
- Cultural and Historical sites – Sites of historical or cultural significance such as the WWII Observation Posts will be protected from wildfire through mechanical and chemical treatment and / or prescribed burns.
- Fire-sensitive habitats – Habitats will be mapped and their fire sensitivity prioritised. Environmental burns to maintain biodiversity will be planned annually. Prescribed burning will be conducted at the end of the Wet season and in the early Dry season.
- Wildfire control – Wildfires will be reported to NTFES and action taken to control their spread whenever possible.
- Fire history recording and fire monitoring – Emphasis will be placed on systematically recording fires and maintaining the fire history of the Reserve.
- Controlled burning in the Reserve will be in accordance with the *Fire and Emergency Act*.
- The Parks and Wildlife Commission will provide assistance to the NTFES when possible.

Weeds

Management of weeds to enhance natural values

The Parks and Wildlife Commission has responsibility under the *Weeds Management Act* to control the spread of declared weeds and, in some instances eradicate them from the Park estate. There are currently 33 weed species recorded in the Reserve. All declared weed species are required to be managed under legislative requirements. Five key declared weed species found in the Reserve include:

- Chinee Apple (*Ziziphus mauritiana*)
- Gamba grass (*Andropogon gayanus*)
- Grader grass (*Themeda quadrivalvis*)
- Lantana (*Lantana camara*)
- Mission grass (*Cenchrus polystachios*)

Weed species such as Gamba and Mission grass have the potential to invade intact habitats, permanently alter habitat types and cause degradation and loss of habitat and plant diversity. For Casuarina Coastal Reserve, this could mean a gradual depletion in the canopy and a transition to more grass dominated habitats. These weeds increase fuel loads leading to more frequent and higher intensity fires resulting in significant impacts to the environment and often infrastructure. For these reasons these weeds require intensive management.

It is important to maintain surveillance for the incursion of other legislated weeds such as Bellyache Bush (*Jatropha gossypifolia*) and Mimosa (*Mimosa pigra*) from neighbouring suburbs through the storm water drains. If found, these species will be controlled or eradicated, where possible.

The Parks and Wildlife Commission work with local community groups to rehabilitate areas and promote biodiversity in the Reserve. The Casuarina Coastal Reserve Landcare Group currently undertakes rehabilitation works and biodiversity conservation projects within specific areas of the Reserve. Individual, formal volunteers and volunteers groups (such as Conservation Volunteers Australia) assist with weed management in the Reserve. The Parks and Wildlife Commission value these individuals and groups and the work they undertake in the Reserve and will continue to work with these groups to protect biodiversity values through weed control and revegetation.

The Parks and Wildlife Commission employ Indigenous people in conservation management programs across the Territory. Through this program, the Parks and Wildlife Commission currently employ Larrakia rangers to undertake weed management in the Reserve, among other tasks.

Management of weeds to enhance visitor values

The Reserve is the most visited park in the Northern Territory, receiving over 935 000 visits annually. It is, therefore, essential for the Parks and Wildlife Commission to manage the Reserve to enhance the visitor experience. For this reason, some weeds are managed solely for visitor amenity and comfort. Weeds such as Caltrop, Mossman River grass and Khaki weed will be controlled 2 metres either side of all paths, visitor access points and in all picnic and other visitor use areas to promote visitor enjoyment.

Management Actions

- Prepare an annual Weed Action Plan in collaboration with the Department of Land Resource Management's Weed Management Branch. The Plan will:
 - target the protection of key biodiversity locations and areas of high visitor use;
 - target strategically identified areas where Gamba grass is present; and
 - target strategically identified areas that have the potential to cause the further spread of Gamba and Mission grass such as Service roads.
- All paths, tracks, visitor access points, picnic and visitor use areas will be managed to control weeds to enhance the visitor experience.
- Maintain surveillance for the introduction of key weed species such as Mimosa and Bellyache bush.
- Work to raise community awareness and understanding of weeds in the Reserve to promote and encourage the involvement of the local community in the management of weeds on the Reserve.
- Continue to employ Larrakia Rangers to undertake weed management, where resources allow.
- Continue to monitor weed distribution / density and amend annual Weed Action Plans as necessary.
- Collect weed data and forward to the Weed Management Branch for integration into the NT Weed Dataset.
- Work with neighbours to facilitate cooperative management of fire and weeds.

Feral Animals

Twelve feral animal species have been recorded in the Reserve including cat, wild dog, cane toad, house mouse, black rat, Asian house gecko, flower-pot blind snake, rock dove, two land snails (*Subulina octona* and *Lamellaxis gracilis*), the big-headed ant and a striped millipede.

Feral animals can impact on the natural values of the Reserve through spreading exotic diseases, preying on native animals and they compete with native animals for food and habitat. The complete eradication of all feral animals from the Reserve is, however, not feasible due to its close proximity to urban areas and as there are no long-term control methods for species such as the cane toad and the cat. The cane toad is listed as a Key Threatening Process under Commonwealth legislation.

Currently, the only feral animal which is managed in the Reserve is the wild dog. Wild dogs have been known to attack domestic dogs, visitors and wildlife. Rangers work with the City of Darwin or Wildlife Management to remove wild dogs from the Reserve.

Management Actions

- Work with the relevant authority to remove any wild dogs from the Reserve.
- Seek opportunities to work with community groups to assist in managing / reducing cane toad numbers in the Reserve.

Mosquitoes

Large areas of the Reserve are regularly inundated by salt, brackish or fresh water. Areas where water ponds, can provide breeding grounds for large numbers of mosquitoes. As long as the water flows or has a stable population of fish or insects that eat mosquito larvae, mosquito populations are kept under control. Naturally occurring depressions and depressions created by vehicle tracks and gullying also provide mosquito breeding sites.

The saltmarsh mosquito (*Aedes vigilax*) is a vector of Ross River virus and other human arboviral diseases and canine heartworm. Breeding sites for saltmarsh mosquito occur in areas where tidal water or rainwater pools for a period of over five days, including creek lines, storm water drains, mangrove margins, and depressions in the upper tidal zone (above 7.4m ACD).

The Parks and Wildlife Commission contracts the management of mosquitoes to the Medical Entomology Branch of the Department of Health, which carries out work in the Reserve to control mosquito breeding sites. However, despite these works, increased run off from urban development does cause problems and requires constant monitoring to maintain effective mosquito control.

Department of Health staff monitor for the presence of mosquito larvae in the Reserve. If larvae are detected in areas where no natural predators exist, spraying with environmentally friendly larvicides is carried out.

Management Actions

- Continue to contract out the management of mosquitoes to the Medical Entomology Branch of the Department of Health. Medical Entomology will continue to use larvicides as required.
- Identify works to mitigate topographic issues to reduce potential mosquito breeding sites, where necessary.
- Continue to liaise with neighbouring landholders to reduce and /or better manage run-off from disturbed areas on surrounding land.

5.0 Management of Cultural Values

5.1 Aboriginal Cultural Values

Outcome

- Significant cultural sites are protected in the Reserve.

Casuarina Coastal Reserve is of cultural importance to the Larrakia people who are the traditional custodians for the area. The Reserve contains one registered and five recorded sacred sites under the *Northern Territory Sacred Sites Act*, as detailed below:

- Darriba Nungalinya (Old Man Rock) is located offshore from Dripstone Park and is a registered sacred site. The Larrakia name Darriba is the title given to senior ceremonial men of the Larrakia tribe and Nungalinya means rock.
- Mudjamurriba is a site associated with Darriba Nungalinya which consists of the vegetated zone between Lee Point and a point directly opposite Darriba Nungalinya.
- Burial grounds believed to be associated with the Tiwi Islanders.
- A large fig tree in the dunes adjacent to Rapid Creek Oval, which is the site of an Aboriginal battlefield.
- The northern tip of Lee Point, which is an historic lookout point.
- A site at Buffalo Creek.

The Larrakia people believe that Darriba Nungalinya is an old man who resides in the rock and whose spirit, when aroused or upset by the actions of humans, wreaks havoc by way of a meteorological event, such as a severe storm or cyclone. Many of the Larrakia people believe that Darriba Nungalinya was responsible for Cyclone Tracy (Northern Exposure 2014). The Larrakia people maintain that damage to Old Man Rock in any way, whether by chipping off shellfish, turning over boulders or drilling holes to moor boats or buoys is to wound their ancestor, so such activities are forbidden. People may however, fish in the area.

The management of Aboriginal sites will be guided by the Aboriginal Areas Protection Authority (AAPA) and the *Northern Territory Aboriginal Sacred Sites Act*. Further, the *Northern Territory Aboriginal Sacred Sites Act* provides protection for sacred sites by requiring a person who proposes to use or conduct work on land to apply for an Authority Certificate. An Authority Certificate will only be issued if the use of or work on the land can proceed without there being a substantial risk of damage or interference with a sacred site on or in the vicinity of the land or if an agreement is reached between the applicant and the custodians of the sacred site. Subject to the terms of the *Northern Territory Aboriginal Sacred Sites Act*, this protection enables custodians of the sacred site to say who can enter the site and what can happen in or on the site.

Nothing in the *Territory Parks and Wildlife Conservation Act*, limits the right of Aboriginal people who have traditionally used an area of land or water from continuing to use that area in accordance with Aboriginal tradition for hunting, food gathering and for ceremonial and religious purposes. Traditional hunting is still carried out in select areas of the Reserve with Aboriginal people mainly hunting fish and shellfish. Larrakia women annually visit a site near Lee Point to collect ochre.

5.2 European Cultural Values

Outcome

- No avoidable damage to the significant heritage sites in the Reserve.

Following World War I, Darwin's exposed north coast saw a substantial military build-up as it was considered an ideal landing place for an attacking force. A coastal defence strategy was developed in anticipation of possible land or sea invasion. In 1939, six 'Singapore-pattern' observation posts were constructed along Casuarina Beach. At least 11 were built in the Reserve in the years leading up to 1942. The purpose of these posts was to provide a clear view of the sea and along the length of the beach.

Remnants of 10 observation posts remain within the Reserve. One of these posts is a declared heritage site (Sandy Creek Observation Post), two posts were deemed to be unsafe and were demolished, two posts located on the beach are beyond repair and the remaining six are in the process of being nominated for heritage listing.

The Reserve also contains a concrete bunker, concrete cistern and remnants of a corduroy crossing from World War II. Aside from the observation posts built into the top of Dripstone Cliffs, the majority of the defence installations in the Reserve are in poor condition with little opportunity for long term protection or restoration (NRETAS, 2011).



The World War II bunker at Sandy Creek

The *Heritage Act* provides protection to archaeological places and objects in the Territory. Under the *Heritage Act*, consent is required before work is carried out on or in relation to an archaeological place and object. Archaeological site clearance must be sought for any works, including conservation, to prescribed archaeological sites in the Reserve.

Management Actions

- Interpret the Aboriginal and European cultural values in the Reserve, appropriately.
- Continue to protect and manage the Sandy Creek Observation Post as required under the Heritage Act.
- Prepare a Heritage Management Plan for the WWII sites within the Reserve in consultation with the Heritage Branch.

6.0 Reserve Administration

Outcome

- Responsible management and appropriate and effective administration of Casuarina Coastal Reserve.

The Parks and Wildlife Commission of the Northern Territory is responsible for the daily management of Casuarina Coastal Reserve. Overall management of the Reserve is guided by a legislative and policy framework, in particular the *Territory Parks and Wildlife Conservation Act*, Regulations and By-laws. For proper management of the Reserve, and the safety of persons and property, it is essential that By-laws and regulations are in place and properly enforced.

Funding for the management of the Reserve including administrative, staffing, infrastructure and services is sourced through the Northern Territory Government. Capital works and funded works programs are subject to Territory-wide government priorities and as such the managers of the Reserve must compete for funding against other parks and reserves across the NT Park Estate. Park managers ensure effective allocation of funding across reserve management and infrastructure requirements. Reserve and agency-wide priorities, performance indicators, monitoring, evaluation and reporting are integrated into a management cycle.

Management of Casuarina Coastal Reserve is carried out by rangers based at headquarters currently located in Berrimah. These rangers also manage a number of other parks in the Darwin Parks Region including Charles Darwin National Park, Holmes Jungle Nature Park and Knuckey Lagoons Conservation Reserve.

As the Reserve receives the highest visitor numbers of any park or reserve in the Northern Territory, it would be valuable to have a ranger station in the Reserve. This would enable visitors to have face-to-face interactions with rangers and assist in improving security and public safety in the Reserve through a regular ranger presence. The development of a ranger station could potentially be linked to a café to further enhance the visitor experience.

Work and Business Opportunities

Reserve management can provide work and business opportunities for the local community. Contract services and business opportunities in the Reserve may include services supporting visitors, cleaning the Reserve's facilities, general repairs and maintenance of infrastructure, walking track maintenance, fencing, construction and weed control. Opportunities for contract services and new businesses in the Reserve which enhance the visitor experience or assist in Reserve management will be encouraged. The Larrakia Nation Aboriginal Corporation Rangers have worked in the Reserve on land management and infrastructure projects.



Larrakia Rangers constructing new beach access boardwalks in the Reserve

Mining

Two areas in the Reserve have been declared as Reserved Land (RL390 and RL2696) under the *Mineral Titles Act* which means they are generally not available for mining. RL390 declared in 1974, includes a large area of Darwin and covers all of the terrestrial area of the Reserve and RL26296, declared in 2007, covers much of the Darwin Harbour and includes all of the marine elements of the Reserve.

Development Proposals and Concessions

Proposals to develop commercial accommodation or other commercial infrastructure within or adjacent to the Reserve may arise during the life of this Plan. Such developments may present significant opportunities for business partnerships and result in benefits for visitors, local economies and expanded Reserve services.

The Parks and Wildlife Commission has prepared a Commercial Development policy. This policy provides a clear over-arching process to facilitate the development of privately developed and operated tourism infrastructure in NT Parks. Any major proposals or new works will be required to comply with this policy and be assessed commensurate with the scale of potential impact consistent with Northern Territory and Commonwealth legislation.

Concessions provide services that are appropriately offered by private enterprise. Concessions can be an important tool for managing visitors and better use of staff resources. Well managed concessions can make the Reserve more accessible and more enjoyable to a greater number of people and benefit the tourism industry.

Permits are issued to businesses that provide appropriate services, assist management or will enhance the visitor experience within the Reserve. It is essential that commercial activities undertaken in the Reserve are of a high standard and are compatible with the Reserve's character and values. All concessionary operations are required to operate in accordance with the Act, the By-laws and where relevant, the *Commercial Development Policy*. The Reserve has potential for the development of commercial opportunities including but not limited to, a café or kiosk.

Management Actions

- Continue to work closely with the Larrakia Nation Aboriginal Corporation to provide opportunities for Larrakia Rangers to work in the Reserve.
- Commercial opportunities in the Reserve will be promoted and encouraged. Local Aboriginal people will be encouraged to take up commercial tourism opportunities within the Reserve.
- Consider and assess potential impacts of any proposed activity or development commensurate with the scale of potential impact consistent with Northern Territory and Commonwealth legislation, as appropriate.
- All commercial operations within the Reserve are required to operate under a concession lease or license agreement in accordance with the Act, the By-laws and where relevant the Parks and Wildlife Commission Commercial Development Policy.
- Ensure that the type and number of operations does not damage the natural values or compromise the character and / or visitor experience in the Reserve.

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